REMARKS

Upon entry of the present amendment, claims 1,3, 5, 6, 8 and 9 will have been amended to correct informalities in the claim language and to more clearly define the invention, while not substantially affecting or narrowing the scope of these claims. Claim 8 has also been amended to recite adjusting an angle of convergence based on a measured object distance. In addition, claims 10-14 will have been submitted for the Examiner's consideration. Further, Figs. 7 and 12 will have been amended to correct an informality. Applicants respectfully submit that all pending claims are now in condition for allowance.

More particularly, claim 10 recites that the object distance measuring device performs an active (as opposed to passive) distance measurement. Claims 11 and 12 are directed to measuring the distance to the object from a point on the common plane located between the photographing optical systems. Claims 13 and 14 are directed to the pair of photographing optical systems performing a focusing function based on data obtained from a corresponding pair of passive distance devices. As discussed below, the reference cited by the Examiner does not teach or suggest any of the subject matter recited in the newly submitted claims.

Furthermore, Applicants respectfully request approval of the proposed corrections to Figs. 7 and 12, both of which have been amended to replace "AF" (auto-focus) with ---AE--- (auto-exposure) to be consistent with the specification. In particular, the specification

provides that "the AE control is carried out in accordance with the mean brightness thus obtained (S125)." See page 15, lines 19-20.

In the above-referenced Official Action, the Examiner rejected claims 1-9 under 35 U.S.C. § 102(b) as being anticipated by SORIMACHI et al. (U.S. Patent No. 4,818,858). Applicants respectfully traverse this rejection, at least for the reasons stated below.

Generally, the present invention is directed to a stereo camera that includes two photographing optical devices arranged in a common plane. A controller controls a convergence angle between the photographing optical devices, to adjust an amount of common (or overlapping) photographic coverage of two photographing optical devices, based on a measured distance to the object being photographed. The distance is measured by an object distance measuring device. See, e.g., Figs. 6 and 7.

The system disclosed by SORIMACHI et al. differs from the invention in a number of key respects. Overall, SORIMACHI et al. do not disclose a camera, but rather a visual sensor system that may be used, for example, in a robot to enhance automated operations. See, e.g., col. 2, lines 22-51. Because SORIMACHI et al. do not disclose a camera, it necessarily follows that they do not disclose photographing optical systems. For example, elements 1 and 2 in Fig. 2 are described merely as "imaging devices," not photographing optical systems. Applicants respectfully submit that the Examiner's rejection under 35 U.S.C. § 102(b) is therefore inappropriate.

Moreover, SORIMACHI et al. do not teach an object distance measuring device or adjusting a convergence angle based on a measured distance. In fact, SORIMACHI et al. expressly teach calculating the distance to a target object, so a distance measuring device is not even suggested.

More particularly, SORIMACHI et al. disclose a light emitting device 26 in a first imaging device 1 and a corresponding convergence angle adjusting sensor 36, such as one-dimension array sensor, in a second imaging device 2. The light emitting device 26 emits light, which is reflected off the target object and detected at an incident position on the array of sensor 36. See, e.g., col. 3, lines 17-46. A detection circuit 41 detects the light incident position on the array and produces signals indicating the relative position (e.g., the direction and distance) between the detected light incident position and a predetermined position on the array, which indicates the convergence point between the imaging devices 1 and 2. The control circuit 42 then drives the motor 13 to center the detected light incident position based on the signals indicating the relative position. See, e.g., col. 4, lines 9-18. There is no indication whatsoever of changing the convergence angle of the imaging devices 1 and 2 based on a measured distance to the target object.

The Examiner cited col. 1, lines 42+ of SORIMACHI et al. to teach "an object distance measuring device," which provides that a visual sensor "can bring an imaging lens to an in-focus position by detecting a distance to an object." Id. However, in light of the

disclosure, "detecting" in the cited portion of SORIMACHI et al. is clearly intended to mean calculating, not measuring. In particular, the distance calculation is performed by a distance calculation circuit 43, which initially calculates a rotation angle of the second imaging device 2, based on the rotation angle of an attached driving motor 13. The distance calculation circuit 43 then calculates the distance to the object based on the rotation angle of the second imaging device 2 and the known separation distance between the imaging devices 1 and 2. See, e.g., col. 33-40. No distance measuring takes place in this process.

Furthermore, regardless of whether it is calculated or measured, the distance to the object is used to focus the imaging lens of the imaging device 1 and 2, not to adjust the convergence angle between the two devices, as in the present invention. See, e.g., col. 4, lines 41-44. In fact, SORIMACHI et al. cannot even determine the distance to the object until after the convergence angle has been determined.

Accordingly, since SORIMACHI et al. do not disclose each and every element of Applicants' claimed invention, withdrawal of the rejections under 35 U.S.C., § 102(b) based on SORIMACHI et al. is respectfully requested. With regard to claims 2-7, Applicants assert that they are allowable at least because they depend from independent claim 1, which the Applicants submit has been shown to be allowable.

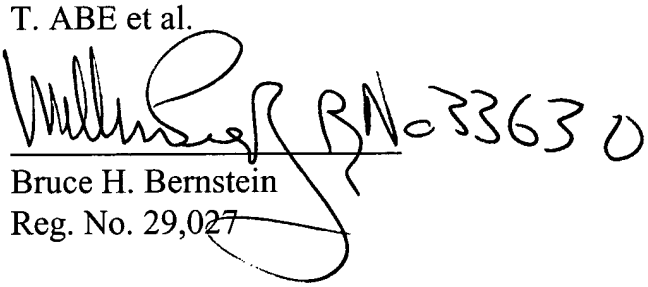
In view of the herein contained amendments and remarks, Applicants respectfully request reconsideration and withdrawal of previously asserted rejections set forth in the

Official Action of October 16, 2002, together with an indication of the allowability of all pending claims, in due course. Such action is respectfully requested and is believed to be appropriate and proper.

Any amendments to the claims which have been made in this amendment, and which have not been specifically noted to overcome a rejection based upon the prior art, should be considered to have been made for a purpose unrelated to patentability, and no estoppel should be deemed to attached thereto.

Should the Examiner have any questions concerning this Replay or the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

Respectfully submitted,
T. ABE et al.



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MARKED UP COPY OF CLAIMS

1. (Amended) A stereo camera comprising:

a pair of photographing optical systems [arranged] that produces a corresponding pair of photographing areas, said pair of photographing optical systems being located in a common plane [so that] to enable a common photographing coverage [occurs] between [a] each of the pair of photographing areas [taken by said pair of photographing optical systems];

an object distance measuring device that measures a distance to an object;

a convergence angle adjustment mechanism [adapted to vary] that varies an angle of convergence, defined by[, and between, the] optical axes of said pair of photographing optical systems, [so as] to adjust an amount of [said] the common photographic coverage of said pair of photographing optical systems; and

a controller [adapted to control] that controls said convergence angle adjustment mechanism in accordance with object distance data [obtained by said object distance measuring device] corresponding to the measured distance to the object.

3. (Amended) The stereo camera according to claim 2, wherein said drive mechanism comprises:

a pair of rotary plates [whose] having respective center axes of rotation [are] in parallel with each other, [each of] said pair of rotary plates [support each respective] supporting said pair of photographing optical systems and having inter-meshing sector gears;

[sector gears provided on each of said pair of rotary plates, the sector gears of one of said pair of rotary plates being in mesh with the sector gear of the other of said pair of rotary plates;]

a sector worm wheel provided on one of said rotary plates; and

a worm which is in mesh with said sector worm wheel, said worm being secured to a drive shaft of a motor.

5. (Amended) The stereo camera according to claim 1, wherein said convergence angle adjustment mechanism comprises a drive mechanism [which] that moves at least a part of each of said pair of photographing optical [system] systems in a direction of [the] a base length of said pair of photographing optical systems.

6. (Amended) The stereo camera according to claim 1, wherein each of said pair of photographing optical systems [is provided with a respective first and second] comprises an image pickup device [wherein when passive measurements] that performs a passive measurement of [the] an object distance [are carried out by said first and second image pickup device, measurement points], such that a measurement point of said [first and second] image pickup [devices are] device is located on a closest side of [the] a field angle [thereof] of the corresponding photographing optical system, with respect to [the] a median line [thereof] of the field angle[, closest to a corresponding respective one of said second and first image pickup devices].

8. (Amended) A stereo camera comprising[;]:

at least a pair of photographing optical systems arranged in a common plane; and

a convergence angle [control device which] controller that varies an angle of convergence defined by [and between the] optical axes of said pair of photographing optical systems [in accordance with] based on at least a measured object distance [data].

9. (Amended) A stereo camera comprising:

a pair of photographing optical systems [arranged] that produce a corresponding pair of photographing areas, said pair of photographing optical systems being located in a common plane [so that] to produce a common photographing coverage [occurs] between [a] each of the pair of photographing areas [taken by said pair of photographing optical systems];

an object distance measuring device that measures a distance to an object;

a photographic coverage adjustment device [adapted to adjust] that adjusts an amount of [said] the common photographic coverage of said pair of photographing optical systems; and

a controller [adapted to control] that controls said photographic coverage adjustment device in accordance with object distance data [obtained by said object distance measuring device] corresponding to the measured distance to the object.